

# PATENT SPECIFICATION

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## (54) VEHICLE WITH A BALLAST WEIGHT

(71) We, KLOCKNER-HUMBOLDT-DEUTZ AKTIENGESELLSCHAFT, a German Body Corporate, of Köln-Deutz, German Federal Republic, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to a motor vehicle, for example a tractor or vehicle for use in the building industry, the vehicle having a support structure for supporting a ballast weight and having a front and/or rear  
 15 mounted implement carrying boom which may be raised or lowered by one or more piston-and-cylinder actuators.

Some known vehicles of the aforementioned kind comprise a loading device including a forwardly extending boom, the vehicle having the ballast weight support structure at the front thereof to provide optimum ballasting when towing heavy earth-working equipment. The ballast weight is in the form of individual ballast weights, which can be used in sufficient numbers to provide the required total weight, by being suspended on the support structure. However, when the vehicle is used as a loader, the ballast weight usually has to be removed, for technical reasons and in order to protect the front axle and its wheels from overloading. In the case, however, of heavy vehicles, such as tractors with engines 80 HP or more, the driver has to exert considerable physical effort in order to dismantle the front ballast weight assembly, since the amount of ballast assembled on modern commercial tractors of this capacity may be of the order of 300 to 500 kg.

In order to solve this problem, in the case of a tractor having a ballast weight at its front, it has been proposed to suspend the ballast weight from a rail and couple the rail to a special lifting device which constantly supports the ballast weight. The lifting device is controlled from the tractor driver's

cabin, using a special control for raising and lowering the ballast weight. However, this method of providing a special mounting for the ballast weight is too expensive for use in agricultural vehicles since the cost of agricultural machinery is already very high. Furthermore, the known solution has a disadvantage in that impacts encountered by the vehicle front axle, more particularly when travelling over ploughed fields, are applied with equal intensity to the lifting jacks supporting the ballast weight, resulting frequently in the destruction of the fluid seals in the jacks.

An aim of the invention is to improve a vehicle of the aforementioned kind using simple constructional means and making multiple use of existing constructional elements, so that the ballast weight can be applied and removed without physical effort by the driver.

To achieve this aim, the invention is directed to a vehicle having a boom, a piston-and-cylinder actuator for raising and lowering the boom, and a support structure for supporting a ballast weight, a connecting rod being provided for connection between the boom and the ballast weight whereby the ballast weight may be raised and lowered by correspondingly raising and lowering the boom by means of the actuator so that the ballast weight may be mounted on and removed from the vehicle, the boom having means thereon for the pivotal connection thereto of the rod.

Preferably, the connecting rod is so proportioned and positioned as to serve as a support for the boom when the boom is removed from the vehicle, whereby the boom may be supported by the free end of the rod resting on the ground.

The ballast weight can be made particularly inexpensive and easy to handle, if the ballast weight is a container which can be filled with sand, stone or the like, so that the container can be tipped to lighten the weight if required and the container is

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coupled to the loading device.

Other features and advantages of the invention will be clear from the accompanying drawings, which show two embodiments, and in which:—

5 Figure 1 shows a vehicle in the form of a tractor, wherein the ballast weight is suspended or released according to the teaching of the invention, with the ballast weight resting on the ground;

10 Figure 2 shows the vehicle of Figure 1 with the ballast weight suspended;

Figure 3 shows another embodiment of the invention with the ballast weight resting on the ground; and

15 Figure 4 shows the embodiment of Figure 3 with the ballast weight suspended.

The tractor as shown in Figure 1 has bearing blocks, brackets or the like indicated at 3 connected to its engine housing 2 on both sides of its body 1, these components being made up of self-supporting constructional units not described in detail. The bearing blocks support a front loading device generally indicated at 4 which comprises a vertically pivotable twin armed boom 6 secured to the blocks 3 by bolts 5, and a pair of double-acting piston-and-cylinder actuators 7 used for raising and lowering the boom 6. The actuators 7 are pivoted to the bearing blocks 3 by pins 8, and to the boom 6 by pins 9. At the front of boom 6 forked coupling elements at the ends of the arms of boom 6 receive projections 10 of a front loading shovel or scoop 11 which can be bolted to or unbolted from boom 6 by means of locking and releasing elements (not shown).

The tractor in Figures 1 and 2 has a support structure or mounting 13 for a front ballast weight 14, connected to the front of a block 12 which is a rigid constructional element of the body 1 and carries the front axle. Ballast weight 14 comprises individual ballast weights 15 and a base part 16, secured together by rod-shaped securing means 17 passing through the weights 15 and not shown in detail. On each side of weights 15, the securing means 17 are bridged by a crossbar 18 comprising a pivot bearing 19. A pair of coupling rods 20 connect the arms of the boom 6 with the crossbar 18 which forms part of the securing means for the individual weights 15. The rods 20 are pivotally secured at pivot bearings 19 on the crossbars 18 and at pivot bearings 21 on the boom 6. The individual ballast weights 15 each have a recess 22 on the tractor side, equal in width to mounting 13, and a recess 23 at the front. At the top, weights 15 have a recess 24.

The vehicle shown in Figures 1 and 2 and comprising the front loading device 4 operates as follows, in association with the

front ballast weight 14. If, in order to use the tractor for heavy ploughing or similar work, the front axle block 12 has to be weighted with ballast weight 14 in order to compensate the weight of an accessory connected at the rear, the tractor is driven up to the ballast weight 14 and into a coupling position. In the coupling position, rod 20 is coupled to pivot bearing 21 and ballast weight 14, and a control device (not shown) for extending the actuators 7 is operated to cause ballast weight 14 to be raised above the level of mounting 13. The actuators 7 are then retracted and weight 14 is lowered on to the mounting. When the tractor 1 is travelling along a road and the compensating ballast 14 is in the suspended position, that is, resting on mounting 13, the boom 6 is connected, for traffic safety reasons, by rod 20 to mounting 13. If the ballast weight 14 has to remain suspended from the tractor and the front loader 4 has to be dismantled because the tractor is required for agricultural use, the coupling rods 20 on each side are released from the bearings 19, and after loader 4 has been lowered into its released position supported on the ground by the free ends of rods 20, the boom 6 can be dismantled and disconnected from the actuator 7. If the spacing of the bearings on rods 20 corresponds to the spacing of pivot pins for boom 6 in the dismantled position, rods 20 can remain connected to the aforementioned pins to support the loader 4.

In the embodiment shown in Figures 3 and 4, in contrast to the embodiment in Figures 1 and 2, the ballast weight 25 is in the form of a container which can be filled with stone, sand or the like. On the vehicle side, container 26 has hooks 27 which can engage mounting 13. Hooks 27 are bridged on each side by a crossbar 18 connected by rods 20 to boom 6. Container 26 can be wholly or partially emptied by releasing the front coupling bolt of crossbar 18 to produce a change in the position of the centre of gravity so that container 26 automatically tips and empties when boom 6 is in the raised position.

At the top, container 26 has a handle 28 on each side, so that it can be manually suspended in mounting 13 when empty.

It should be noted that the invention is similarly applicable to a device for lifting ballast weights at the rear of the vehicle. According to the invention also, the front loader 4 can be arranged to suspend and release a ballast weight from a mounting which is at the rear of the vehicle, in the manner shown in Figures 1 to 4. In order, however, to ensure that the rear ballast weight can be automatically suspended and released, actuators 7 or boom 6 of loader 4

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should be connectible to the rear ballast weight via suitable intermediate connecting members.

WHAT WE CLAIM IS:—

- 5 1. A vehicle having a boom, a piston-and-cylinder actuator for raising and lowering the boom, and a support structure for supporting a ballast weight, a connecting rod being provided for connection between  
10 the boom and the ballast weight whereby the ballast weight may be raised and lowered by correspondingly raising and lowering the boom by means of the actuator so that the ballast weight may be mounted  
15 on and removed from the vehicle, the boom having means thereon for the pivotal connection thereto of the rod.
2. A vehicle according to claim 1, wherein that end of the connecting rod remote from  
20 the boom is adapted to be connected to the support structure to support the boom during movement of the vehicle.
3. A vehicle according to claim 1 or claim  
25 2, wherein the connecting rod is so proportioned and positioned as to serve as a support for the boom when the boom is removed from the vehicle, whereby the

boom may be supported by the free end of the rod resting on the ground.

4. A vehicle according to any preceding claim, wherein the boom comprises two arms, two said actuators, and two said connecting rods. 30

5. A vehicle according to claim 4, wherein the ballast weight comprises a plurality of individual members arranged side-by-side in a direction transverse to the longitudinal axis of the vehicle, the weight members being secured together by a securing means passing through such members, the free ends of the connecting rods being adapted to be connected respective the securing means on each side of the ballast weight. 35 40

6. A vehicle according to any one of claims 1 to 4, wherein the ballast weight is a container for ballast material, means being provided for tipping the container for emptying the same. 45

7. A vehicle substantially as herein described with reference to the accompanying drawings. 50

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FIG.1

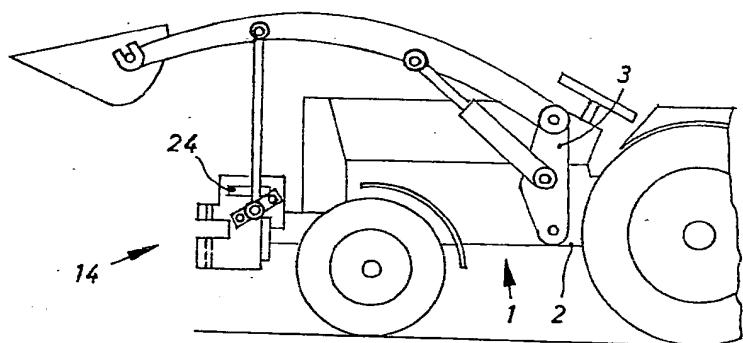
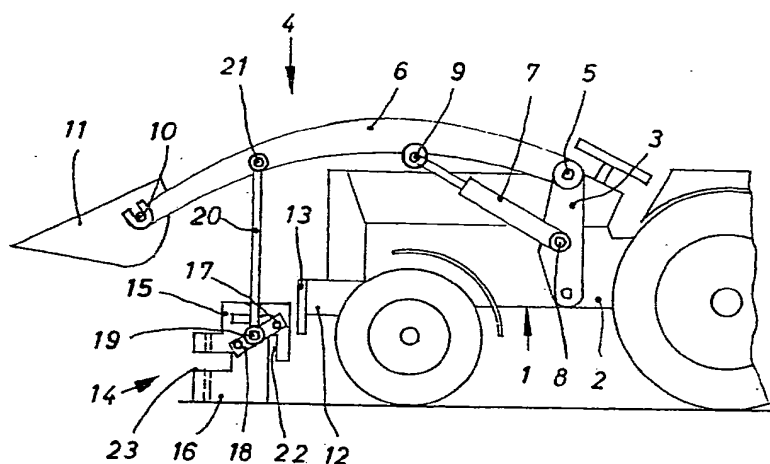


FIG. 2

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COMPLETE SPECIFICATION

2 SHEETS

*This drawing is a reproduction of  
the Original on a reduced scale*

Sheet 2

FIG:3

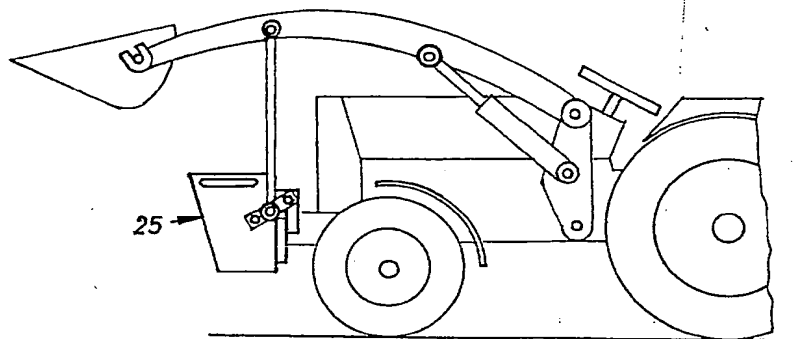
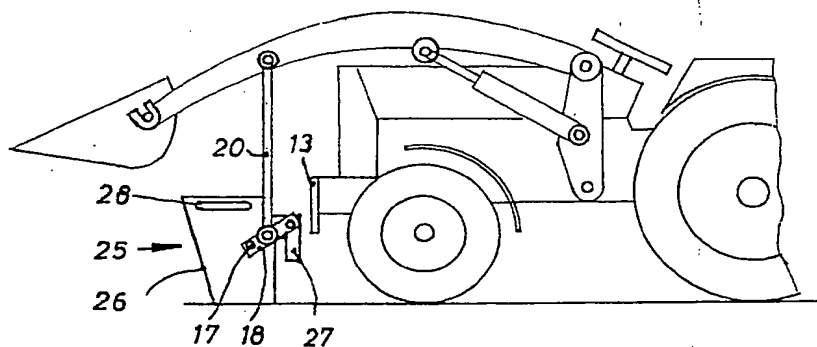


FIG:4

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